

Laporan
Tugas Kecil 1 IF2211 Strategi Algoritma
Penyelesaian *Word Search Puzzle* dengan Algoritma *Brute Force*



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ALGORITMA BRUTE FORCE

1. Mencari huruf pertama dari sebuah kata dalam puzzle.
2. Jika huruf pertama tidak ditemukan, pencarian gagal.
3. Jika huruf pertama ditemukan, cek kedelapan arah dari posisi huruf tersebut untuk menemukan huruf selanjutnya yang cocok.
4. Jika tidak ditemukan huruf yang cocok, kembali ke langkah ketiga dengan arah lainnya. Jika setelah mencoba kedelapan arah tetapi tidak menemukan kata yang cocok, kembali ke langkah pertama.
5. Jika ditemukan kata yang cocok, program selesai atau lanjut ke kata selanjutnya (jika ada).

SOURCE CODE

Bahasa Pemrograman: C++

```
#include <iostream>
#include <fstream>
#include <chrono>
using namespace std;

int getRow(string Line) {
    int row = 0;
    for (int i = 0; i < Line.length(); i++) {
        if (Line[i] == '\n') {
            row++;
        }
    }
    return row;
}

int getColumns(string Line) {
    int columns = 0;
    for (int i = 0; i < Line.length(); i++) {
        if (Line[i] == ' ' || Line[i] == '\n') {
            columns++;
        }
    }
    return columns/getRow(Line);
}

string displayAnswerMatrix(int row, int col, int rowStart, int colStart, int
rowEnd, int colEnd, string answerList) {
    int i,j,k;
    string matrix[row][col];
    string answerMatrix = "";

    for(i=0;i<row;i++) {
        for(j=0;j<col;j++) {
            matrix[i][j] = '-';
        }
    }

    //kiri ke kanan
    if(rowStart == rowEnd && colStart > colEnd){
        for(j=colStart,k=0;j>=colEnd,k<answerList.length();j--,k++) {
            matrix[rowStart][j] = answerList[k];
        }
    }

    //kanan ke kiri
```

```

    if(rowStart == rowEnd && colStart < colEnd){
        for(j=colStart,k=0;j<=colEnd,k<answerList.length();j++,k++) {
            matrix[rowStart][j] = answerList[k];
        }
    }

    //atas ke bawah
    if(colStart == colEnd && rowStart > rowEnd){
        for(i=rowStart,k=0;i>=rowEnd,k<answerList.length();i--,k++) {
            matrix[i][colStart] = answerList[k];
        }
    }

    //bawah ke atas
    if(colStart == colEnd && rowStart < rowEnd){
        for(i=rowStart,k=0;i<=rowEnd,k<answerList.length();i++,k++) {
            matrix[i][colStart] = answerList[k];
        }
    }

    //diagonal atas kiri ke bawah kanan
    if(rowStart < rowEnd && colStart < colEnd) {
        for(i=rowStart,j=colStart,k=0;i<=rowEnd,j<=colEnd,k<answerList.length(
);i++,j++,k++) {
            matrix[i][j] = answerList[k];
        }
    }

    //diagonal atas kanan ke bawah kiri
    if(rowStart < rowEnd && colStart > colEnd) {
        for(i=rowStart,j=colStart,k=0;i<=rowEnd,j>=colEnd,k<answerList.length(
);i++,j--,k++) {
            matrix[i][j] = answerList[k];
        }
    }

    //diagonal bawah kiri ke atas kanan
    if(rowStart > rowEnd && colStart < colEnd) {
        for(i=rowStart,j=colStart,k=0;i>=rowEnd,j<=colEnd,k<answerList.length(
);i--,j++,k++) {
            matrix[i][j] = answerList[k];
        }
    }

    //diagonal bawah kanan ke atas kiri
    if(rowStart > rowEnd && colStart > colEnd) {
        for(i=rowStart,j=colStart,k=0;i>=rowEnd,j>=colEnd,k<answerList.length(
);i--,j--,k++) {

```

```

        matrix[i][j] = answerList[k];
    }
}

for(i=0;i<row;i++) {
    for(j=0;j<col;j++) {
        answerMatrix += matrix[i][j] + " ";
    }
    answerMatrix += '\n';
}

return answerMatrix;
}

int main() {
    // Open file
    string filename;

    cout << "Enter filename (without \".txt\") : ";
    cin >> filename;

    ifstream readFile("../test/" + filename + ".txt");

    // Iterate every line to puzzle variable
    string puzzle;
    string line;
    while(getline (readFile, line) && line != "") {
        puzzle += line + "\n";
    }

    // Get answers
    int answerSize = 0;
    string answers;
    while(getline (readFile, line) && line != "") {
        answerSize++;
        answers += line + "\n";
    }

    // Make list of answers
    string answerList[answerSize];
    int i,j,k,direction,letter,n,o;
    for(i=0; i<answerSize; i++) {
        answerList[i] = answers.substr(0, answers.find('\n'));
        answers = answers.substr(answers.find('\n')+1);
    }

    // Get rows and columns
    int col = getColumn(puzzle);

```

```

int row = getRow(puzzle);

// Covert puzzle to matrix
char matrix[row][col];

k=0;
for(i=0;i<row;i++) {
    for(j=0;j<col;j++) {
        while(puzzle[k] != ' ' && puzzle[k] != '\n') {
            matrix[i][j] = puzzle[k];
            k++;
        }
        k++;
    }
}

int totalCompare = 0;
int compare;

// Record start time
auto start = chrono::high_resolution_clock::now();

// START BRUTE FORCE
for(k=0;k<answerSize;k++) {
    cout << "\n" << "Word " << k+1 << ": " << answerList[k] << endl;
    bool found = false;
    compare = 0;
    i=0;
    while(i<row && !found) {
        j=0;
        while(j<col && !found) {
            if(answerList[k][0] == matrix[i][j] && found != true) {
                direction=0;
                while(direction<8 && found != true) {
                    if(direction == 0) { //atas
                        letter=1;
                        n=i;
                        while(letter<answerList[k].length() && n<=row-1 &&
found != true) {
                            if(answerList[k][letter] != matrix[n][j]) {
                                compare++;
                                break;
                            }
                        }
                        else if(letter == answerList[k].length()-1) {
                            found = true;
                            totalCompare += compare;
                        }
                    }
                }
            }
            j++;
        }
        i++;
    }
}

```

```

        cout << "(" << i << "," << j << ")" << "
=> " << "(" << n-1 << "," << j << ")" << " | " << compare << " Comparison(s)"
<< endl;

        cout << displayAnswerMatrix(row, col, i,
j, n-1, j, answerList[k]);

        break;
    }
    letter++;
    n--;
}
direction++;
}
else if(direction == 1) { //kanan atas
    letter=1;
    n=i;
    o=j;
    while(letter<answerList[k].length() && n>=0 &&
o<col && found != true) {
        if(answerList[k][letter] != matrix[n-1][o+1])
        {
            compare++;
            break;
        }
        else if(letter == answerList[k].length()-1) {
            found = true;
            totalCompare += compare;
            cout << "(" << i << "," << j << ")" << "
=> " << "(" << n-1 << "," << o+1 << ")" << " | " << compare << "
Comparison(s)" << endl;
            cout << displayAnswerMatrix(row, col, i,
j, n-1, o+1, answerList[k]);

            break;
        }
        letter++;
        n--;
        o++;
    }
    direction++;
}
else if(direction == 2) { //kanan
    letter=1;
    o=j;
    while(letter<answerList[k].length() && o<col &&
found != true) {
        if(answerList[k][letter] != matrix[i][o+1]) {
            compare++;
            break;
        }
    }
}

```



```

else if(letter == answerList[k].length()-1) {
    found = true;
    totalCompare += compare;
    cout << "(" << i << "," << j << ")" << "
=> " << "(" << i << "," << o+1 << ")" << " | " << compare << " Comparison(s)"
<< endl;

    cout << displayAnswerMatrix(row, col, i,
j, i, o+1, answerList[k]);

    break;
}
letter++;
o++;
}
direction++;
}
else if(direction == 3) { //kanan bawah
    letter=1;
    n=i;
    o=j;
    while(letter<answerList[k].length() && n<row &&
o<col && found != true) {
        if(answerList[k][letter] != matrix[n+1][o+1])
        {
            compare++;
            break;
        }
        else if(letter == answerList[k].length()-1) {
            found = true;
            totalCompare += compare;
            cout << "(" << i << "," << j << ")" << "
=> " << "(" << n+1 << "," << o+1 << ")" << " | " << compare << "
Comparison(s)" << endl;

            cout << displayAnswerMatrix(row, col, i,
j, n+1, o+1, answerList[k]);

            break;
        }
        letter++;
        n++;
        o++;
    }
    direction++;
}
else if(direction == 4) { //bawah
    letter=1;
    n=i;
    while(letter<answerList[k].length() && n<row &&
found != true) {
        if(answerList[k][letter] != matrix[n+1][j]) {

```

```

        compare++;
        break;
    }
    else if(letter == answerList[k].length()-1) {
        found = true;
        totalCompare += compare;
        cout << "(" << i << "," << j << ")" << "
=> " << "(" << n+1 << "," << j << ")" << " | " << compare << " Comparison(s)"
<< endl;

        cout << displayAnswerMatrix(row, col, i,
j, n+1, j, answerList[k]);

        break;
    }
    letter++;
    n++;
}
direction++;
}
else if(direction == 5) { //kiri bawah
    letter=1;
    n=i;
    o=j;
    while(letter<answerList[k].length() && n<row &&
o>=0 && found != true) {
        if(answerList[k][letter] != matrix[n+1][o-1])
        {
            compare++;
            break;
        }
        else if(letter == answerList[k].length()-1) {
            found = true;
            totalCompare += compare;
            cout << "(" << i << "," << j << ")" << "
=> " << "(" << n+1 << "," << o-1 << ")" << " | " << compare << "
Comparison(s)" << endl;

            cout << displayAnswerMatrix(row, col, i,
j, n+1, o-1, answerList[k]);

            break;
        }
        letter++;
        n++;
        o--;
    }
    direction++;
}
else if(direction == 6) { //kiri
    letter=1;
    o=j;

```

```

                                while(letter<answerList[k].length() && o>=0 &&
found != true) {
                                if(answerList[k][letter] != matrix[i][o-1]) {
                                    compare++;
                                    break;
                                }
                                else if(letter == answerList[k].length()-1) {
                                    found = true;
                                    totalCompare += compare;
                                    cout << "(" << i << "," << j << ")" << "
=> " << "(" << i << "," << o-1 << ")" << " | " << compare << " Comparison(s)"
<< endl;
                                    cout << displayAnswerMatrix(row, col, i,
j, i, o-1, answerList[k]);
                                    break;
                                }
                                letter++;
                                o--;
                            }
                            direction++;
                        }
                        else if(direction == 7) { //kiri atas
                            letter=1;
                            n=i;
                            o=j;
                            while(letter<answerList[k].length() && n>=0 &&
o>=0 && found != true) {
                                if(answerList[k][letter] != matrix[n-1][o-1])
{
                                    compare++;
                                    break;
                                }
                                else if(letter == answerList[k].length()-1) {
                                    found = true;
                                    totalCompare += compare;
                                    cout << "(" << i << "," << j << ")" << "
=> " << "(" << n-1 << "," << o-1 << ")" << " | " << compare << "
Comparison(s)" << endl;
                                    cout << displayAnswerMatrix(row, col, i,
j, n-1, o-1, answerList[k]);
                                    break;
                                }
                                letter++;
                                n--;
                                o--;
                            }
                            direction++;
                        }
                    }
                }
            }
        }
    }
}

```

```

        }
    }
    else if(i==row-1 && j==col-1){
        cout<< "Not Found" << endl;
    }
    compare++;
    j++;
}
compare++;
i++;
}
}

// Record end time
auto finish = chrono::high_resolution_clock::now();

cout << "\nPuzzle size: " << col << " x " << row << endl;

chrono::duration<double> elapsed = finish - start;
cout << "Elapsed time: " << elapsed.count() << " s" << endl;

cout << "Total comparison: " << totalCompare << " Comparison(s)" << endl;

readFile.close();
}

```

SCREENSHOT INPUT OUTPUT

1. Test Case sm1.txt (small)

Input	Output
Enter filename (without ".txt"): sm1 Word 1: AMBER (1,4) ⇒ (1,0) 23 Comparison(s) - - - - - R E B M A -	Word 23: RAZOR (5,11) ⇒ (1,11) 92 Comparison(s) - - - - - - - - - - R - - - - - O - - - - - Z - - - - - A - - - - - R - Puzzle size: 12 x 14 Elapsed time: 0.0345285 s Total comparison: 2377 Comparison(s)

2. Test Case md3.txt (medium)

Input	Output
<pre>Enter filename (without ".txt"): md3 Word 1: ALBANIA (11,9) ⇒ (17,15) 529 Comparison(s)</pre> <div style="background-color: black; color: white; padding: 10px;"> <p>(The grid contains the word ALBANIA at row 11, column 9, highlighted in green in the original image.)</p> </div>	<pre>Word 50: NETHERLANDS (0,12) ⇒ (0,2) 26 Comparison(s) - - S D N A L R E H T E N - - - - -</pre> <div style="background-color: black; color: white; padding: 10px;"> <p>(The grid contains the word NETHERLANDS at row 0, column 12, highlighted in green in the original image.)</p> </div>
<pre>Puzzle size: 22 x 22 Elapsed time: 0.070071 s Total comparison: 16570 Comparison(s)</pre>	<pre>Puzzle size: 22 x 22 Elapsed time: 0.070071 s Total comparison: 16570 Comparison(s)</pre>

3. Test Case lg1.txt (large)

Input	Output
<pre> Enter filename (without ".txt"): lg1 Word 1: AKIROSE (21,6) ⇒ (15,0) 1098 Comparison(s) ----- E S O R I K A ----- </pre>	<pre> Word 54: WATAME (5,21) ⇒ (0,16) 209 Comparison(s) ----- E M A T A W ----- </pre> <pre> ----- Puzzle size: 32 x 34 Elapsed time: 0.104654 s Total comparison: 39285 Comparison(s) </pre>

4. Test Case lg3.txt (large)

Input	Output
<pre> Enter filename (without ".txt"): lg3 Word 1: AGNESDIGITAL (2,24) ⇒ (13,24) 138 Comparison(s) ----- A G N E S D I G I T T A L ----- </pre>	<pre> ----- Y O R B O R O N N E Z ----- </pre> <pre> Puzzle size: 34 x 34 Elapsed time: 0.104077 s Total comparison: 37622 Comparison(s) </pre>

SOURCE CODE FILE

https://github.com/kentlius/Tucil1_13520069/blob/master/src/main.cpp

Poin	Ya	Tidak
1. Program berhasil dikompilasi tanpa kesalahan (no syntax error)	√	
2. Program berhasil <i>running</i>	√	
3. Program dapat membaca file masukan dan menuliskan luaran	√	
4. Program berhasil menemukan semua kata di dalam puzzle.	√	